

# Biology Seminar

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## **The biosynthesis and transport of the growth hormone, auxin, regulates vegetative and reproductive development in plants**

The plant growth hormone auxin regulates many aspects of cell expansion, cell division and tissue outgrowth in plants. Auxin is synthesized locally and transported long distances for proper plant development. Multiple pathways for auxin biosynthesis have been proposed, but until recently few genes functioning in these predicted pathways had been identified.

We have recently cloned the vanishing tassel2 (*vt2*) locus of the model monocot maize using a positional cloning approach. Phylogenetic analyses indicate that *vt2* is co-orthologous to the tryptophan aminotransferase (TAA) genes of the model dicot *Arabidopsis*, which function in the indole-3-pyruvic acid (IPA) pathway of auxin biosynthesis. Unlike the TAA mutants which have subtle defects, a single *vt2* knock-out results in strong vegetative and reproductive defects. *vt2* mutants have severely reduced plant height due to the production of fewer leaves, as well as significant reductions in reproductive structures compared to normal.

A similar phenotype to *vt2* is seen in the maize sparse inflorescence1 (*spi1*) mutant. *spi1* encodes a monocot-specific member of the YUCCA gene family functioning in the tryptamine auxin biosynthesis pathway. Furthermore, unlike the YUCCA mutants in *Arabidopsis* where quadruple knockouts are required for strong defects, a single *spi1* knock-out results in severe vegetative and reproductive defects. Therefore, even though both *spi1* and *vt2* are members of genes families, these genes exhibit less redundancy in function in maize than *Arabidopsis*.

Both *vt2* and *spi1* show very localized patterns of expression, indicating that local auxin biosynthesis plays a critical role in maize development. The synergistic interaction between *vt2* or *spi1* and the auxin transport mutant barren inflorescence2 (*bif2*) has revealed that auxin synthesized by these pathways must be transported for proper vegetative and reproductive development. Therefore, auxin transport and auxin biosynthesis have overlapping roles in plant development.

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**3:30 PM**

**LIFE-106 (old Biology Bldg)**